APPLICATION FOR UNITED STATES LETTERS PATENTS

FOR

TIME SLOT BASED CALENDAR ACCESS CONTROL

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Time Slot Based Calendar Access Control

<u>BACKGROUND OF THE INVENTION</u>

1.   Field of the Invention

5   The present invention relates to the field of data processing. More specifically, the present invention relates to computer hosting of multi-user calendar systems, including in particular, controlling user access to the hosted calendars with at least time slot granularity.

10   2.   Background Information

Computer hosted calendaring systems in general are known in the art. Examples of known calendar systems include client/server based systems such as Outlook and Lotus, available from Microsoft Corp of Redmond, WA, and IBM of Armonk, NY, respectively, and web based calendar systems such

15   as those offered by Microsoft Network (MSN) and Yahoo.

Typically, these systems provide to an individual user a computer maintained record of the individual user's event schedule, and data associated with each event in the schedule, arranged for viewing in a temporal presentation. Each event usually has three components, a starting

20   time, an ending time, and a description, with the starting time and the ending time together defining an event time-slot. The temporal presentation is generally arranged according to a calendar. The calendar is generally arranged according to several selectable views that include a yearly view, a monthly view, a weekly view, a two-day view, and a daily view.

Further, these calendaring systems are typically hosted on networked computer systems. The networked calendaring system permits a calendar owner's calendar, whose events are maintained and/or stored by one computer system, to be accessed on another computer system functionally

5   connected to the computer system that maintains and/or stores the calendar owner's calendar. In these networked calendaring systems, a calendar owner's calendar is generally maintained and stored on a server system, with the calendar owner, and other potential user's of the calendar, functioning as clients in relation to the server. Alternatively, the calendar owner's calendar

10   may be maintained and stored in the calendar owner's computer, with other users functionally connected to the calendar owner's computer directly.

A computer hosted calendaring system is conventionally accessible by authorized users other than the calendar owner, who can read and/or write event data from and to the calendar owner's schedule. However, these

15   calendaring systems provide to these authorized users an authorization for only the entire calendar owner's calendar (except for conventionally designated private events), rather than for uniquely defined time-slots for a read and/or a write operation. Moreover, these systems do not provide for a plurality of user groups or user types, with each user group/user type defined

20   by a set of distinct authorized time-slots for a read and/or a write operation.

SUMMARY OF THE INVENTION

Apparatuses and methods for controlling accesses to calendaring events in a computing system are disclosed. For each individual user, a defined user group, or an user type, the calendar owner may designate the time-slots in his or her calendar to which the user, users of the user group, and/or user type may have a time slot based read access, and/or a time slot based write access, to his or her calendar. The time slot based read access and the time slot based write access time-slots may be separately defined.

A non-owner party attempts to gain read and/or write access to the calendar owner's calendar at a time slot granularity level. The non-owner party is checked for access privilege at the time slot level. The access privilege at the time slot level may have been explicitly given to the non-owner party or implicitly given by virtue of the non-owner party's affiliation with an authorized user group or user type. If the non-owner party has been so given access privilege to the requested time slots, the non-owner party is accorded access to the requested time-slots.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be described by way of exemplary embodiments, but not limitations, illustrated in the accompanying drawings. Identical numerals indicate the same elements throughout the figures.

Figure **1** is an exemplary Owner Authorization menu (Long Version) presented to a calendar owner on a computer system display, according to

one embodiment. A calendar owner uses the Owner Authorization menu to grant to a non-owner party, or non-owner parties having a group affiliation or a user type, read and/or write accesses to selective time slots of the owner's calendar.

5   Figure **2** is an exemplary Quick Authorization menu for granting time slot based calendar access to a non-owner party by associating the non-owner party with a user type according to one embodiment.

Figure **3** is the exemplary Owner Authorization menu of Figure **1** in which both read and write access data for a time slot of the calendar owner's

10   calendar has been entered for a user, a user group, or a user type.

Figure **4** is an exemplary conventional monthly calendar with entries of a calendar owner's calendar, presented on a computer system display or alternatively printed.

Figure **5** is an exemplary conventional two-day calendar for the days

15   Thursday June 8, and Friday June 9, corresponding to the calendar of Fig. **4**, presented on a computer system display or alternatively printed.

Figure **6** is an exemplary monthly calendar display/print extracted from the calendar owner's monthly calendar portrayed in Figure **4**, for a non-owner party (having restricted read access), according to one embodiment.

20   Figure **7** is an exemplary conventional two-day calendar display/print for the calendar owner, with entries that are consistent with the entries portrayed in Figure **4** for an exemplary date June 12.

Figure **8** is an exemplary conventional two-day calendar display/print for the calendar owner, with entries that are consistent with the entries portrayed in Figure **4** for an exemplary date June 13.

Figure **9** is an exemplary conventional two-day calendar display/print for the calendar owner, with entries that are consistent with the entries portrayed in Figure **4** for an exemplary date June 15.

Figure **10** is an exemplary two-day calendar display/print for the non-owner party (having restricted access), the calendar owner's June 12 calendar portrayed in Figure **7,** according to one embodiment.

Figure **11** is an exemplary two-day calendar display/print for a non-owner party (having restricted access), the calendar owner's June 13 calendar portrayed in Figure **7,** according to one embodiment.

Figure **12** is an exemplary two-day calendar display/print for a non-owner party (having restricted accesses), the calendar owner's June 15 calendar portrayed in Figure **8,** according to one embodiment.

Figure **13** is an exemplary Guest menu for a non-owner party to access a calendar owner's calendar, to read from and/or write to the calendar owner's calendar, according to one embodiment.

Figure **14** is an exemplary Guest Calendar Event Entry menu for a non-owner party to write into a calendar owner's calendar, according to one embodiment.

Figures **15a-15d** and **16** are exemplary control data structures suitable for use to practice the present invention.

Figure **17** is a flowchart portraying a method according to one

embodiment, to grant a non-owner party read and/or write access to selected

time slots of a calendar owner's calendar.

Figure **18** is a flow chart portraying a method according to one

5   embodiment, to associate a non-owner party with a user type.

Figure **19** is a flow chart portraying a method according to one

embodiment, to control access by a non-owner party to a calendar owner's

calendar.

Figure **20** is an exemplary computer system suitable for use to practice

10   the present invention, according to an embodiment.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is directed toward a calendar system having time

15   slot based control of non-owner party's access to a calendar owner's

calendar. In the description to follow, various aspects of the present invention

will be described. However, the present invention may be practiced with only

some or all aspects of the present invention. For purposes of explanation,

specific numbers, materials and configurations are set forth in order to

20   provide a thorough understanding of the present invention. However, the

present invention may be practiced without the specific details. In other

instances, well known features are omitted or simplified in order not to

obscure the present invention.

Some portions of the detailed descriptions that follow are presented in terms of algorithms and symbolic representations of operations on data bits within a computer memory. These algorithmic descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art. An algorithm is here, and generally, conceived to be a self-consistent sequence of steps leading to a desired result. The steps are those requiring physical manipulations of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated. It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like.

It should be borne in mind, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise as is apparent from the following discussion, it is appreciated that throughout the description, discussions utilizing terms such as "processing" or "computing" or "calculating" or "determining" or "displaying" or the like, refer to the action and processes of a computer system, or similar electronic computing device, that manipulates and transforms data represented as physical (electronic) quantities within the computer system's registers and memories into other data similarly represented as physical quantities within

the computer system memories or registers or other such information storage, transmission or display devices.

The present invention also relates to apparatus for performing the operations herein. This apparatus may be specially constructed for the required purposes, or it may include a general purpose computer selectively activated or reconfigured by a computer program stored in the computer. Such a computer program may be stored in a computer readable storage medium.

The algorithms and displays presented herein are not inherently related to any particular computer or other apparatus. Various general purpose systems may be used with programs in accordance with the teachings herein, or it may prove convenient to construct more specialized apparatus to perform the required method steps. The required structure for a variety of these systems will appear from the description below. In addition, the present invention is not described with reference to any particular programming language. It will be appreciated that a variety of programming languages may be used to implement the teachings of the invention as described herein.

Various operations will be described as multiple discrete steps performed in turn in a manner that is most helpful in understanding the present invention, however, the order of description should not be construed as to imply that these operations are necessarily order dependent, in particular, the order the steps are presented. Furthermore, the phrase "in one

embodiment" will be used repeatedly, however the phrase does not necessarily refer to the same embodiment, although it may.

Referring now to Figure **1**, a calendar owner (or other party having access authority for the calendar, hereinafter calendar owner) may preferably call up an Owner Authorization menu (Long Version) **101** of the calendar system of the present invention on a computer display to give access to a non-owner party, non-owner parties of a user group, or a user type, to the owner's calendar on a time slot basis. For the purpose of this application, a non-owner party is a non-owner user of a computer system. Accordingly, for ease of description, a non-owner party may also simply be referred to as a user, hereinafter. A user group is a collective designation of a plurality of users, e.g. "Dept99" as a group identification may represent all users that are members of a "Department 99". A user type is a characterization given to a plurality of users, e.g. "Teachers", "Friends", "Study Partners", and so forth.

Typically, a non-owner party is identified by his or her system log-in ID. However, alternative identification means may be employed instead. Likewise, a user group is identified by a user group name or identification, typically given by a system administrator for the plurality of group members. As with user types, the present invention contemplates that a plurality of user types are pre-provided, however, a calendar owner may add to or subtract from the pre-provided user types. Provision of such facilities is well within the ability of those ordinarily skilled in the art; accordingly, these facilities will not be described.

As illustrated, the Owner Authorization menu **101** has a User data

entry field **102** for designating a user, a user group, or a user type to be given

an access status to the owner's calendar on a time slot basis. The user

preferably selects the User data entry field **102**, and subsequently enters the

5   user, group, or user type identification, via a computer keyboard, with the

entry subsequently displayed in the User data entry field **102**.

For the illustrated embodiment, the Owner Authorization menu **101**

also has a selection field **104a** for designation (i.e. granting) of a read access

status, and a selection field **104b** for designation (i.e. granting) of a write

10   access status **104b** for a calendar time slot for an operational period. In one

embodiment, the default access status for any non-owner party (group or user

type) is no-access, but whatever access status that was previously selected

for a non-owner party (group or user type), it is preferably maintained until the

authorized access is changed. In order to give read access to the non-owner

15   party (group or user type), the owner selects the read access selection field

104a, and in order to not give read access to the non-owner party (group or

user type), the owner does not select the read access selection field **104a**.

Similarly, in order to give write access to the non-owner party (group or user

type), the owner selects the write access selection field **104b**, and in order to

20   not give write access to the non-owner party (group or user type), the owner

does not select the write access field **104b**. The calendar owner selects both

the read access selection field **104a** and the write access selection field **104b**,

in order to give both a read and a write access to the non-owner party (group

or user type), and the calendar owner does not select the read access field

104a and the write access field **104b**, in order to not give either a read and a write access to the non-owner party (group or user type).

The Owner Authorization menu **101** has selection fields **106a** and **106b** for designation of the time-periods within the calendar owner's calendar,

5   and the duration, for which the non-owner party (group or user type) is being given read access and write access, respectively. The read access and write access selection fields **106a** and **106b** preferably include time period selection fields **106a1** and **106b1** for designating the time periods. The read access and write access selection fields **106a** and **106b** preferably further

10 include separate selection fields for designating recurrent access for each selected day of the week or everyday of the week **106a2** and **106b2**, and separate fields for designating the duration for which the specifications apply **106a3** and **106b3**.

The Owner Authorization menu **101** also has selection fields **103** for

15 designation of event types, which may include exemplary event types of "meeting", "appointment", "reminder", and "event". The calendar owner may optionally select these event types in an embodiment of the present invention, to further restrict a non-owner party's access to the writing of specific event types, or the reading of specific event types, within the valid access time-

20 slots, and for the specified duration.

Referring now to Figure **2**, a Quick Authorization menu **108** of the calendar system of the present invention in accordance with one embodiment, is shown. Quick Authorization menu **108** enables a non-owner

party be quickly granted access to selective time slots of a calendar owner's calendar for a pre-determined duration, by associating the non-owner party a user type. Upon associating the non-owner party with a user type, the non-owner party is implicitly granted the same access rights for the same time

5   slots and duration, as the access rights previously granted to the user type.

The calendar owner preferably selects the User ID data entry field **109a,** and subsequently enters the non-owner party's identification into User ID data entry field **109a**. Thereafter, the calendar owner preferably selects the User Type data entry field **109b**, and subsequently enters a user type in

10   the User Type entry field **109b**. As alluded to earlier, typically, the user type entered has been previously granted access to selective time slots of the calendar owner's calendar by way of the Owner Authorization menu **101** of Fig. **1**. For the illustrated embodiment, a browse button **109c** is also advantageously provided to facilitate the calendar owner in selecting a user

15   type from pre-provided user types for entry into User Type entry field **109b**.

In a preferred embodiment of the present invention, only a calendar owner may enter data into this menu. A specific example of the utility of this aspect of the present invention is a calendar owner first assigning an access status for selective time slots to a user type "teachers" using Owner

20   Authorization menu **101**. Then, the calendar owner may grant access to his/her teacher "Ann" by entering the name "Ann" in User data entry field **109a** of Quick Authorization menu **108**, and associating the name "Ann" with the user type "teacher" (entered in User Type field **109b**). As a result, non-

owner party "Ann" is granted the same access for the same selective time

slots and duration previously defined for all "teachers".

Referring now to Figure **3**, a calendar owner has entered data into the

5   Owner Authorization menu **101** described with reference to Figure **1**. In this

exemplary Owner Authorization menu data entry, a calendar owner has

granted both a read access and a write access to users of the "Teacher" user

type, for the time slots between 9:00 a.m. – 3:00 p.m. on weekdays (Monday-

Friday), from September 1, 2001 to June 15, 2002. This is an example

10   illustrative of the utility and novelty of the present invention, wherein a

calendar owner may selectively grant both, or either, a read and write access

for different selectively time-periods for different user groups/types for a

specified duration. In the example portrayed, the entries are consistent with a

student calendar owner granting both a read access and a write access for

15   his or her calendar to any non-owner user subsequently identified as his/her

teacher, during, and only during, the traditional time-slots of the traditional

school day (for the coming academic year). Other useful non-owner parties

are, for instance, social friends having calendar access on Friday and

Saturday nights, and study group members having calendar access on

20   weekday nights, for also the coming school year or a different duration,

including an indefinite duration.

In User data entry field **102**, the calendar owner has entered the user

type identifier "Teacher" as the identification of the user type to have access

to the user's calendar. The calendar owner has designated in read access

field **104a**, a read access, and in write access field **104b**, a write access, to

users of the user type "Teacher". In the read access day of the week

selection field **106a1**, the calendar owner has selected Mondays, Tuesdays,

Wednesdays, Thursdays, and Fridays, thus giving to all "teachers" a read

5   access to the calendar owner's calendar for each day Monday-Friday. In the

duration selection field **106a3**, the calendar owner has specified "09/01/01

through 06/15/02" as the duration the above described read access

authorization applies. In the write access day of the week selection field

106b1, the calendar owner has selected Mondays, Tuesdays, Wednesdays,

10   Thursdays, and Fridays, thus giving to all "teachers" a write access to the

calendar owner's calendar for each day Monday-Friday. In the write access

time-period selection field **106b3**, the calendar owner has specified "09/01/01

through 06/15/02" as the duration the above described write access

authorization applies.

15   Thus, the calendar owner, by entering data into the exemplary Owner

Authorization menu **101**, has given to all "teachers" both a read access to

his/her calendar for each day Monday - Friday, from 9:00 a.m. - 3:00 p.m.,

and a write access for each day Monday - Friday, from 9:00 a.m. - 3:00 p.m.,

for the coming school year running from 09/01/01 through 06/15/02.

20   As described earlier, subsequently, the calendar owner may quickly

grant the same access rights to specific teachers by identifying specific non-

owner parties as having the user type "teachers" using Quick Authorization

menu **108** earlier described. For example, using Quick Authorization menu

108, the calendar owner may grant the same access rights to a Mrs. Moore or Mr. Smith, by identifying Mrs. Moore and Mr. Smith as "Teachers".

Referring now to Figure **4**, a conventional exemplary monthly calendar **115** displays a calendar owner's time-slot entries for each day of an exemplary month. The calendar displays for each day, the beginning time for each time-slot entry. It is noted that calendar **115** indicates time entries for each day Thursday June 1, through Saturday June 17, as well as Wednesday June 21, Thursday June 22, and Thursday June 29. With specific exemplary reference to Thursday June 1, the calendar **115** indicates two time-slot entries, the first at 12:00 p.m., and the second at 6:00 p.m., and with specific exemplary reference to Friday June 9, the calendar **115** indicates one time-slot entry beginning at 1:00 p.m..

Referring to Figure **5**, a conventional exemplary two-day calendar **117** for Thursday June 8, and Friday June 9, corresponds to the entries in the monthly calendar **115** portrayed with reference to Figure **4**. The two-day calendar **117** displays that the Friday June 9, time-slot entry portrayed in monthly calendar **115** is for a time beginning at 1:00 p.m. and ending at 4:00 p.m..

Referring to Figure **6**, a preferred embodiment of a non-owner party's view **135** corresponding to the calendar owner's calendar **115**. The non-owner party has a restricted read access for the calendar owner's calendar **115** for the time-slots Mondays – Fridays, 9:00 a.m. – 3:00 p.m. only. The exemplary read access time-slots are consistent with the entries portrayed on

the Owner Authorization menu **101** with reference to Figure **3**. In calendar

135, the only data displayed from calendar owner's calendar **115** is the data

for time-slots Mondays – Fridays, 9:00 a.m. – 3:00 p.m., corresponding to the

exemplary non-owner party's authorized read access time slots. Thus, with

5   reference to both Figures **3** and **5**, the entries for Mondays - Fridays, 3:00

p.m. – 9:00 a.m., and all day Saturdays and Sundays, have been omitted

from the calendar owner's calendar **115** for presentation of the calendar for

this particular non-owner party.

The entries **110a-o** of Figure **4** fall fully within the time-slots Mondays –

10   Fridays, 9:00 a.m. – 3:00 p.m., and are displayed in the restricted read

access calendar **135** portrayed in Figure **6**. The entries **120a-e** of Figure **4**,

for all Saturdays and Sundays, are not within the time-slots Mondays –

Fridays, 9:00 a.m. – 3:00 p.m., and are not displayed in the restricted read

access calendar **135** portrayed in Figure **6**. The entries **130a-e** of Figure **4**,

15   which fall outside the read access period of 9:00 a.m. – 3:00 p.m. for

Mondays – Fridays, are also not displayed in the restricted read access

calendar **135** portrayed in Figure **6**.

The time-slot entries that fall only partially within the non-owner party

read access time-slots are preferably portrayed in the non-owner party's

20   calendar with the time-slots falling within the valid non-owner party read

access time-slots displayed (or printed for a printed calendar), but without the

descriptive information otherwise associated with a time-slot entry, and the

time-slots falling outside of the valid non-owner party read access time-slots

not displayed (or printed).

Thus, referring to Figure **4**, time-slot entries **140a-c** are portrayed on the conventional calendar owner's monthly calendar as beginning at 1:00 p.m. on June 12, with descriptive data printed; as beginning at 8:00 a.m. on June 13, with descriptive data printed; and beginning at 7:00 a.m. on June 15,

5   with no descriptive data printed; for entries **140a, 140b**, and **140c** respectively.

Referring to Figure **7**, the conventional calendar owner's two-day calendar for June 12, portrays the entry **140a** beginning at 1:00 p.m. in the monthly calendar, as spanning the time-period 1:00 p.m. – 5:00 p.m. and

10   having an exemplary descriptive data "DOCTOR" **160a**.

Referring to Figure **8**, the conventional calendar owner's two-day calendar for June 13, portrays the entry **140b** beginning at 8:00 a.m., as spanning the time-period 8:00 a.m. – 10 a.m. and having an exemplary descriptive data "MEETING" **160b**.

15   Referring to Figure **9**, the conventional calendar owner's two-day calendar for June 15, portrays the entry **140c** beginning at 7:00 a.m., as spanning the time-period 7:00 a.m. – 10:00 a.m. **160c**.

Again referring to Figure **6**, the second party's preferred embodiment exemplary monthly calendar for June 12 portrays the entry **140a** as time entry

20   **150a** beginning at 1:00 p.m. and having no descriptive data printed. For June 13, the entry **140b** is portrayed as time entry **150b** beginning at 9:00 a.m., rather than 8:00 a.m., and having no descriptive data printed. For June 15, the entry **140c** is portrayed as time entry **150c** beginning at 9:00 a.m. and having no descriptive data printed.

Referring to Figure **10**, the non-owner party's preferred embodiment exemplary two-day calendar for June 12 portrays the Figure **7** time entry **160a**, spanning the time range 1:00 p.m. – 5:00 p.m. and having an associated exemplary descriptive data "Doctor", as a time entry **170a** spanning the time range 1:00 p.m. – 3:00 p.m., so as to be fully within the bounds of the second party's valid read access times 9:00 a.m. – 3:00 p.m., and having no associated descriptive data.

Referring to Figure **11**, the non-owner party's preferred embodiment exemplary two-day calendar for June 13 portrays the Figure **8** time entry **160b**, spanning the time range 8:00 a.m. – 10:00 a.m. and having an associated exemplary descriptive data "MEETING", as a time entry **170b** spanning the time range 9:00 a.m. – 10:00 a.m., so as to be fully within the bounds of the non-owner party's valid read access times, and having no associated descriptive data.

Referring to Figure **12**, the non-owner party's preferred embodiment exemplary two-day calendar for June 15 portrays the Figure **9** time entry **160c**, spanning the time range 7:00 a.m. – 10:00 a.m. and having no associated descriptive data, as a time entry **170c** spanning the time range 9:00 a.m. – 10:00 a.m., so as to be fully within the bounds of the non-owner party's valid read access times, and having no associated descriptive data.

Referring to Figure **13**, a non-owner party user gains both read and/or write access to the calendar owner's calendar by preferably entering appropriate data into a Guest Access menu **180**. The non-owner party

selects and enters in the Open Calendar data entry field **182** an identifier of the calendar he or she is attempting to access. This identifier may be an identifier of the calendar owner. The non-owner party also preferably selects and subsequently enters into the User ID data field **184**, his or her identifier.

5   As alluded to earlier, the user may have been explicitly given access to selected time slots of the calendar owner's calendar, or implicitly given access, by virtue of his or her membership with a group or user type previously attributed to the user.

        Referring to Figure **14**, the exemplary Guest Calendar Event Entry
10   menu **190** includes the data fields appropriate for a non-owner party (having appropriate write accesses) to creation, edit, and/or delete entries of a calendar owner's calendar. It is specifically contemplated that this data may include the event date **192**, beginning and ending time **194**, brief description **196**, event type **198** including an exemplary appointment **198a**, meeting
15   **198b**, event **198c**, and reminder **198d**, and detailed description **199**. If the non-owner party requesting access to the calendar owner's calendar does not have the appropriate write access, in one embodiment, the present invention displays for the non-owner party a corresponding notification.

20   Referring now to Figures **15a-15d** and **16**, wherein a number of control data structures suitable for use to practice the present invention are shown. Illustrated in Fig. **15a** are tables/view **200a** and **200b**, which may be employed to store the user type descriptions **206**, including their identifiers **204**, and the users **208** attributed with the various user types (represented by their

identifiers) **204**, respectively. Illustrated in Fig. **15b** is table/view **220** suitable

for use to track summaries of the accesses granted to the various users, user

groups or user types. As illustrated, for each explicitly granted user, a user

group, or a user type, its identifier **222** is tracked. Further, the starting and

5   ending days **224a-224b** of the specified duration, as well as the nature of the

read and write accesses granted **226** and **228**, if any, are tracked. The

tracking may denote for each of the read and write accesses, either no

access has been granted, limited access has been granted or unlimited

access has been granted.

10   Figures **15c** and **15d** illustrate two exemplary tables/views **240** and **260**

suitable for use to track the additional details, when limited access are

granted for either read or write to a user, a user group or a user type. For

each user, user group, or user type **242**, having limited read/write access,

table/view **240** tracks whether no access, limited access or unlimited access

15   has been granted for each day of the week, Monday, Tuesday, Wednesday,

Thursday, Friday, Saturday and Sunday **244a-244g**. For each user, user

group or user type **262**, having been granted limited read/write access for a

weekday, table/view **260** tracks the limited access granted, including the day

of the week **264**, whether the access is for read, write or both **266**, and the

20   starting and ending time of the particular limited access time slot, **268a-268b**.

Figure **16** illustrates an exemplary working data structure that may be

constructed in memory during operation, when a user request access to a

calendar owner's calendar. Exemplary working data structure **280**, includes a

root segment having the identification of the user **282**, a field for each of the

weekdays **284a-284g**. Within each field **284a-284g**, an annotation is made

denoting whether no access has been granted for the weekday, or a pointer

to the first time slot, if access to at least one of time slots of the weekday is

authorized. Each pointer from the root segment points to a link list, e.g. list

5   **286** or **288** listing the authorized time slots of the particular weekday.

Accordingly, a user's authorization for a particular requested time slot may be

efficiently checked.

Referring now to Figure **17**, wherein a flow chart illustrating a method

10   for supporting the employment of the Owner Authorization menu of Fig. **1** to

grant access to selective time slots of a calendar owner's calendar to a user,

a user group, or a user type is shown. As illustrated, upon invocation, the

calendar software reads the identification of the user, the user group or the

user type, the read/write access selection, the corresponding time slot

15   selections and the duration inputted by the "calendar owner", block **302**.

Thereafter, the calendar software determines if any changes have been made

to the information read, block **304**. For the illustrated embodiment, the

calendar software is assumed to maintain the last known state of the

information (retrieving the information from the control structure at invocation,

20   if necessary).

If changes have been made to the information read, the calendar

software further determines if changes have been made to read access

granted to the user, the user group or the user type, block **306**. If changes

have been made to the read access granted to the user, the user group or the

user type, the calendar software updates the control data structures, e.g. the earlier described exemplary control data structures, down to the time slot granularity level, if necessary, block **308**.

If no changes have been made to read access granted to the user, the user group or the user type, the calendar software further determines if changes have been made to write access granted to the user, the user group or the user type, block **310**. If changes have been made to the write access granted to the user, the user group or the user type, the calendar software updates the control data structures, e.g. the earlier described exemplary control data structures, down to the time slot granularity level, if necessary, block **312**.

Referring now to Figure **18**, wherein a flow chart illustrating a method for supporting the employment of the Quick Authorization menu of Fig. **2** to grant access to selective time slots of a calendar owner's calendar by attributing a user type to a user is shown. As illustrated, upon invocation, the calendar software reads the identification of the user, and the user type inputted by the "calendar owner", block **322**. Thereafter, the calendar software updates the control data structures, e.g. the earlier described exemplary control data structures, down to the time slot granularity level, if necessary, block **324**.

Referring now to Figure **19**, wherein a flow chart illustrating a method for controlling access by a non-owner party to a calendar owner's calendar in

accordance to with the time slot based access granted employing the menus

of Fig. **1** and **2** is shown. As illustrated, upon receipt of a request or an

attempt by a non-owner party to access a time slot or a number of time slots

of a calendar owner's calendar, block **342**, the calendar software determines

5   whether the non-owner party has been granted the right to access the

requested time slot or time slots, block **344**. In one embodiment, the calendar

software determines all the time slots the non-owner party have been given

access rights, whether they are given explicitly or implicitly by virtue of the

non-owner party's membership with a group or by virtue of an attributed user

10   type. As described earlier, the non-owner party's group membership may be

obtained e.g. from an operating system, and the non-owner party's user type,

if applicable, may be obtained e.g. from control tables **202** of Fig. **15a**. For

the embodiment, the requested access is rejected **346** or facilitated **348**

based on the union of all the rights granted. In other words, the present

15   invention contemplates that the non-party owner may have been granted

access rights for certain time slots by virtue of his/her group membership or

user type, and thereafter, the calendar owner further supplements the

defaulted time slot set with additional authorizations for other time slots not

generally granted to other members of the group or user type.

20

Referring to Figure **20**, computer system **400** comprises bus **401**, or

other communication device for communicating information, and processor(s)

402 coupled with bus **401** for processing information. Computing system **400**

further comprises main memory **404**, a computer readable media that is

commonly random access memory (RAM) or other dynamic storage device, coupled to bus **401** for storing information and instructions for execution by processor **402**. Main memory **404** is used to store temporary variables or other intermediate information during execution of instructions by processor

5   **402**. Computer system **400** also comprises a read only memory (ROM) media and/or other static storage device **406** coupled to bus **401** for storing working copies of the working information and instructions implementing the present invention for processor(s) **402**. Data storage device **406**, another computer readable media, is coupled to bus **401** for storing "permanent

10   copies" of the working information and the implementing instructions, and can be such exemplary computer readable media as magnetic disk, and/or an optical disk and corresponding drives. Display **408** is coupled to bus **401** for displaying data generated by the processors **402**, and mouse **410**, or other exemplary selecting or pointing device, and keyboard **412**, each coupled to

15   bus **401**, are used to input data into the processor **402**.

While certain exemplary embodiments have been described and shown in the accompanying drawings, it is to be understood that these embodiments are merely illustrative of and not restrictive of the broad

20   invention. For example, the present invention is presented with reference to a plurality of displays and data input menus. These displays and data input menus are exemplary and illustrative of an embodiment of the present invention, and how the present invention can be used. It is understood that the displays and menus required by the present invention and presented

herein for exemplary purposes are adaptable to conform to the data display

and entry characteristics of other calendaring systems. The present invention

is not limited to the specific constructions and arrangements shown and

described, and alternative embodiments will become apparent to those skilled

5   in the art to which the present invention pertains without departing from the

scope of the present invention. The scope of the present invention is defined

by the appended claims rather than the foregoing description.